

**\*\*FULL TITLE\*\***

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## The influence of the environment on bar formation

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**Abstract.** Galaxy mergers and interactions are mechanisms which could drive the formation of bars. Therefore, we could expect that the fraction of barred galaxies increases with the local density. Here we show the first results of an extensive search for barred galaxies in different environments. We conclude that the bar fraction on bright ( $L > L^*$ ) field, Virgo, and Coma cluster galaxies is compatible. These results point towards a scenario where the formation and/or evolution of bars depend mostly on internal galaxy processes rather than external ones.

### 1. Bar formation: nature vs. nurture

The observational proofs about the influence of the environment on bar formation and/or evolution are still rare. In Aguerri et al. (2009), we investigate a volume-limited sample of 2106 disc galaxies in the nearby universe to derive the bar fraction as a function of the local galaxy density. The local density was calculated for every sample galaxy using the fifth nearest neighbor method, obtaining that 80% of our galaxies were located in very low-density environments ( $\Sigma_5 < 1 \text{ Mpc}^{-2}$ ), and 20% (corresponding to more than 400 galaxies) covers mostly the typical values measured for loose ( $\Sigma_5 > 1 \text{ Mpc}^{-2}$ ) and compact galaxy groups ( $\Sigma_5 \sim 10 \text{ Mpc}^{-2}$ ). We did not find any difference between the local galaxy density of barred and unbarred galaxies in our range of densities.

To extend this conclusion to higher density environments, we have investigated the fraction of barred galaxies present in the two nearby *benchmark* clusters: Virgo (Zarattini et al., in prep.) and Coma (Méndez-Abreu et al., in prep.). In both clusters, we found a bar fraction in their bright galaxy population consistent with that in the field. Similar results have been recently found in cluster at higher redshift by Marinova et al. (2009) and Barazza et al. (2009). However, the errors in the clusters bar fractions are large and the results might be affected by the small number statistics. To deal with this problem, we are undergoing an ambitious project to study the bar fraction in a large sample of cluster galaxies drawn from the WINGS project.

### References

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